AR201-14068

"Signs, Steven" <SAS@Lubrizol.com> on 11/11/2002 03:59:09 PM

To: Rtk Chem/DC/USEPA/US@EPA, NCIC OPPT/DC/USEPA/US@EPA
cc:

Subject: Submission of Category Analysis Document, Robust Summaries and Testing Plan for the Petroleum Oxidates and Derivatives Thereof

The HonorableChristine Todd Whitman

Administrator

U.S.EnvironmentalProtectionAgency

PO Box 1473

Merrifield, VA 22116

Attn: Chemical Right-to-Know Program

Dear Ms. Whitman

On behalf of the Lubrizol Corporation, I am please to submit the Category Analysis Document, Robust Summaries andTesting Plan for the chemical category"Petroleum Oxidates and Derivatives Thereof". The chemicals covered in this category submission include:

- 64742-98-9 Distillates (petroleum), oxidized light
- 64743-00-6 Hydrocarbon waxes (petroleum), oxidized
- 64743-01-7 Petrolatum (petroleum), oxidized
- 68425-34-3 Petrolatum (petroleum), oxidized, Ca salt
- 68602-85-7 Hydrocarbon waxes (petroleum), oxidized, Me esters
- 68603-10-1 Hydrocarbon waxes (petroleum), oxidized, Me esters, Ba salts
- 68603-11-2 Hydrocarbon waxes (petroleum), oxidized, Me esters, Ca salts
- 68603-12-3 Hydrocarbon waxes (petroleum), oxidized, Me esters, Na salts

Please contact me with any questions or comments you might have concerning this submission.

Our HPV registration number is

<<Oxidate Test Plan.pdf>> <<Robust summary.pdf>>

Sincerely

Steven A. Signs, Ph.D., D.A.B.T.

Technical Contact Person for the HPV Chemical Program

 - Oxidate Test Plan.pdf

 - Robust summary.pdf

AR201-14068A

High Production Volume (HPV) Challenge Program

Test Plan for

Petroleum Oxidates and Derivatives Thereof
Category

Prepared By:

The Lubrizol Corporation
29400, Lakeland Blvd.
Wickliffe, OH 44092

2002

Table of Contents

1.0 Introduction

On November 30, 2000, the Lubrizol Corporation committed to provide basic toxicity information on chemicals listed under the Environmental Protection Agency (EPA) High Production Volume (HPV) Chemical Challenge Program. The eight sponsored chemicals addressed in this test plan are:

- 64742-98-9 Distillates (petroleum), oxidized light
- 64743-00-6 Hydrocarbon waxes (petroleum), oxidized
- 64743-01-7 Petrolatum (petroleum), oxidized
- 68425-34-3 Petrolatum (petroleum), oxidized, Ca salt
- 68602-85-7 Hydrocarbon waxes (petroleum), oxidized, Me esters
- 68603-10-1 Hydrocarbon waxes (petroleum), oxidized, Me esters, Ba salts
- 68603-11-2 Hydrocarbon waxes (petroleum), oxidized, Me esters, Ca salts
- 68603-12-3 Hydrocarbon waxes (petroleum), oxidized, Me esters, Na salts

The process of evaluating the members of the "Petroleum Oxidates and Derivatives Thereof" category entailed the following stepwise process:

- grouping of chemicals into a putative category
- gathering relevant data for each member of the category
- evaluating the physico-chemical, environmental, aquatic, and health effect patterns to confirm adequacy of category
- construction of a matrix of SIDS endpoints for category members
- identification of data gaps for critical endpoints within the category

2.0 Development of Oxidates and Derivatives thereof Category

The HPV Challenge Program encourages the development of chemical categories as an economic, animal sparing, and efficient way to complete the program goals. The EPA guidance document, Development of Chemical categories states, "a chemical category is a group of chemicals whose physicochemical and toxicological properties are likely to be similar or follow a regular pattern as a result of structural similarity. The similarities should be based on a common functional group, common precursors or breakdown products (resulting in structurally similar chemical) and an incremental and constant change across the category." A goal of this category analysis document is to use interpolation and/or extrapolation to untested members to reduce the amount of additional testing needed to complete the SIDS requirements.

2.1 Chemical identity

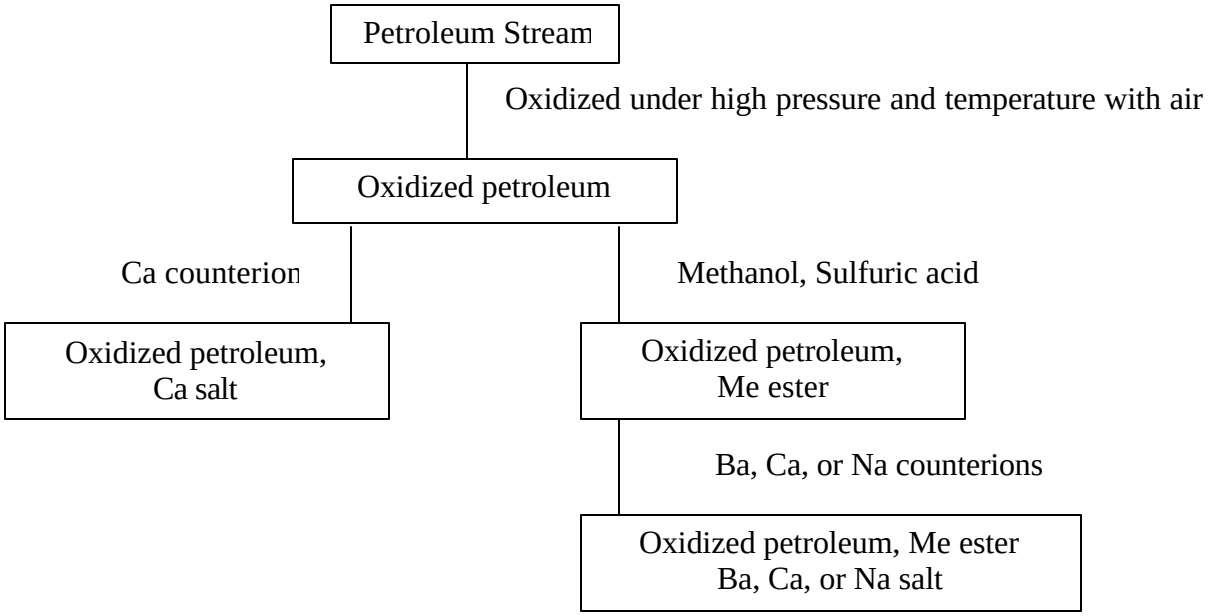
The members of this test plan are petroleum oxidates, oxidized methyl esters, and their salts, which are derived from aliphatic hydrocarbons. The petroleum oxidates vary in molecular weight, which is determined by the starting raw material and the extent of oxidation. The petroleum oxidates described in this test plan are derived from slack wax, petrolatum, or petroleum distillate. The slack wax and petrolatum starting materials range in chain length from C33 to C43 while the petroleum distillate starting material ranges in chain length from C9-C16. There are distinct differences between the petroleum oxidates derived from the slack wax or petrolatum and the light petroleum distillate. These differences

become apparent when comparing their physicochemical properties. Due to the apparent differences in physicochemical properties between the oxidates derived from the slack wax or petrolatum and the oxidates derived from the petroleum distillate, the members of this test plan are divided into two subcategories. Subcategory 1 contains the light oxidized distillate (64742-98-9) derived from the lower molecular weight petroleum distillate. Subcategory 2 contains the petroleum oxidates and derivatives (64743-00-6, 64743-01-7, 68425-34-3, 68602-85-7, 68603-10-1, 68603-11-2, 68603-12-3) derived from the higher molecular weight slack wax and petrolatum.

All of the petroleum oxidates described in this test plan are produced by controlled, liquid phase, partial oxidation using atmospheric air as the oxygen source. Oxidation of the petroleum hydrocarbon is an exothermic reaction, performed under high temperature and pressure.

The typical composition of the petroleum oxidate in subcategory 1 is 50% unreacted petroleum starting material, 10% carboxylic acid (mono- and di-), 25% ketone, the remainder of the composition consists of oxyacids, aldehydes, and methyl ester. The typical composition of the petroleum oxidates in subcategory 2 (64743-01-7 and 64743-00-6) is 40-50% unreacted petroleum starting material, 30-35% monocarboxylic acid, the remainder of the composition consists of dicarboxylic acids, oxyacids, aldehydes, and ketones. The oxidized methyl ester, 68602-85-7, is created by an esterification reaction of the petroleum oxidate using methanol and sulfuric acid. The product of this reaction is a mixture of methyl esters, unreacted starting material, mono and di- carboxylic acids, oxyacids, aldehydes, and ketones. The oxidized petroleum or the oxidized methyl ester intermediates are reacted with Ba, Ca, and Na counterions to form the oxidized salt. The counterions act to neutralize the carboxylic acid functional groups. The typical production process is shown in figure 1.

Figure 1 Production process for oxidate derivatives



2.2 Uses of Petroleum Oxidates and Derivatives Thereof

The properties of the oxidates and their derivatives that make them useful are their ability to repel and displace water. They have excellent lubricity and corrosion protection properties. The oxidates 64742-98-9, 64743-01-7, and 64743-00-6 are used primarily as intermediates. The salt derivatives and the methyl ester derivatives are useful in preparing oil soluble and water dispersing soaps. These soaps are applied to coiled steel and steel sheets to prevent corrosion before receiving a final paint. They are also used as rust preventatives in a variety of other applications. The petroleum oxidates can be used to replace natural fats and oils in the formulation of cutting, drawing, and rolling oils.

3.0 Physical and Chemical Properties

The light petroleum oxidate in subcategory 1 is a liquid at room temperature. The petroleum oxidates and derivatives in subcategory 2 are solids or waxy solids at room temperature. The difference in the physical state of the member in subcategory 1 is due to its variation in carbon chain length of the starting material and the oxidation products. This also accounts for its difference in melting point, boiling point, vapor pressure, octanol water coefficient, and water solubility in comparison to the members in subcategory 2. The differences in the physicochemical properties between the members of subcategory 1 and 2 justifies separating these materials into two separate subcategories.

3.1 Melting Point

There is melting point data available for seven of the eight members of this test plan (Table 1). The melting point for the light petroleum oxidate in subcategory 1 is - 31.03 deg C. The melting point for the petroleum oxidates and derivatives in subcategory 2 range from 33.64 to 49.87 deg. C. The untested member 68603-12-3, oxidized Me ester Na salt, is expected to have a melting point similar to 68603-10-1 and 38603-11-2, the oxidized Me ester Ba salt and Ca salt respectively. There is sufficient melting point data available for the members of this test plan; therefore, additional testing is not required.

3.2 Boiling Point Range

There is boiling point range data available for seven of the eight members of this test plan (Table 1). The petroleum oxidate in subcategory 1 has a boiling point range of 196 to 842 deg F. The petroleum oxidates and derivatives in subcategory 2 have a boiling point range from 379 to >1200 deg F. The untested member 68603-12-3, oxidized Me ester Na salt, is expected to have a boiling point range similar to 68603-10-1 and 38603-11-2, the oxidized Me ester Ba salt and Ca salt respectively. There is sufficient boiling point data available for the members of this test plan; therefore, additional testing is not required.

3.3 Vapor Pressure

There is vapor pressure data available for seven of the eight members of this test plan (Table 1). The petroleum oxidate in subcategory 1 has a vapor pressure of 69 Pa at 25 deg C. The petroleum oxidates and derivatives in subcategory 2 have a

vapor pressure less than 1Pa at 25 deg C. The untested member 68603-12-3, oxidized Me ester Na salt, is expected to have a vapor pressure similar to 68603-10-1 and 38603-11-2, the oxidized Me ester Ba salt and Ca salt respectively. There is sufficient vapor pressure data available for the members of this test plan; therefore, additional testing is not required.

3.4 Partition Coefficient

The octanol water partition coefficient could not be measured for the members of this test plan using OECD guideline 107. This test method would not accurately depict the octanol water coefficient of the members of this category because they are Class 2 substances containing a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for the octanol water partition coefficient. Due to the complex composition of these materials, a definitive octanol water partition coefficient value can not be made. The calculated octanol water coefficient for the raw material, light petroleum distillate, is 3.3 to 7.06 (ASTDR, 1995). The petroleum oxidate in subcategory 1 is expected to have a similar octanol water partition coefficient to this starting raw material. The members in subcategory 2 are expected to have an octanol water partition coefficient similar to that of their starting materials. The HPV test plan for waxes and related materials indicates that petrolatum and slack wax have an octanol water coefficient greater than 4.9 (The Petroleum HPV Testing Group, 2002).

3.5 Water Solubility

There is water solubility data available for seven of the eight members of this test plan (Table 1). The petroleum oxidate in subcategory 1 has a water solubility of 59.34 ppm at 25 deg C. The petroleum oxidates and derivatives in subcategory 2 have very low water solubilities that range from 0.35 to 1.29 ppb at 25 deg C. The untested member 68603-12-3, oxidized Me ester Na salt, is expected to have a water solubility similar to 68603-10-1 and 38603-11-2, the oxidized Me ester Ba salt and Ca salt respectively. There is sufficient water solubility data available for the members of this test plan; therefore, additional testing is not required.

Table 1 Physicochemical Properties

CAS #	Avg. MW	Melting Point deg C	Boiling Point Range deg F	Vapor Pressure at 25 C	Partition Coefficient	Water Solubility at 25 C
Subcategory 1						
64742-98-9	285	-31.03	196 to 842	69 Pa	Estimated 3.3 – 7.06	59.34 ppm
Subcategory 2						
64743-00-6	744	33.64	393 to >1200	<1Pa	Estimated >4.9	1.25 ppm
64743-01-7	2037	38.93	417 to >1200	<1Pa	Estimated >4.9	3.47 ppm
68425-34-3	2260	49.87	665 to >1200	<1Pa	Estimated >4.9	0.35 ppm
68602-85-7	1294	38.02	400 to >1200	<1Pa	Estimated >4.9	5.37 ppm
68603-10-1	1189	42.86	380 to >1200	<1Pa	Estimated >4.9	0.50 ppm
68603-11-2	ND	41.84	379 to >1200	<1Pa	Estimated >4.9	1.29 ppm
68603-12-3	ND	ND	ND	ND	Estimated >4.9	ND

ND – Not determined.

4.0 Environmental Fate

4.1 Photodegradation

Direct photochemical degradation occurs when a chemical substance absorbs solar radiation. If the amount of absorbed energy is high enough, then the resultant excited state of the chemical may lead to its transformation. Simple chemical structures can be examined to determine whether a chemical has the potential for direct photolysis. First order reaction rates can be calculated for some chemicals that have a potential for direct photolysis using the procedures of Zepp and Cline (1977). Photodegradation of the materials in this test plan cannot be measured directly because of their complex mixture. However, UV light absorption of representative chemicals of each subcategory will be evaluated to identify those that have the potential to degrade in solution. For those that have a potential for direct photolysis in water, first order reaction rates will be calculated. The results will be summarized in a robust summary for this endpoint.

Indirect photodegradation (atmospheric oxidation) occurs because of hydroxyl radical (OH-) attack. Atmospheric oxidation can be measured using OECD guideline 113 or estimated using models accepted by the EPA. The computer

program AOPWIN, which is used by OPPTS calculates a chemical half-life based on an overall OH- reaction rate constant, a 12-hr day, and a given OH- concentration. Photodegradation will be calculated for several representative chemical components of each subcategory in this test plan. The resulting calculations will be summarized in a robust summary for this endpoint.

4.2 Hydrolysis

Hydrolysis of a chemical is a transformation process in which an organic chemical reacts with water, forms a new carbon oxygen bond, and cleaves a carbon-X bond in the original molecule, where X is the leaving group. In order for hydrolysis to occur, the chemical must contain a suitable leaving group. Chemicals that have the potential to hydrolyze include alkyl halides, amides, carbamates, carboxylic acid esters and lactones, epoxides, phosphate esters, and sulfonic acid esters (Neely, 1985).

The complex mixture and low water solubility of the materials in this test plan limits the ability to estimate or measure hydrolysis rates. However, the materials in this test plan do not contain hydrolyzable functional groups therefore hydrolysis if any is expected to be slow. Based on the information available, the members of this test plan will not undergo significant hydrolysis and no additional testing is required.

4.3 Fugacity

Fugacity modeling compares the distribution of chemicals between environmental compartments (i.e., air, soil sediment, suspended sediment, water, biota). In the document "Determining the Adequacy of Existing Data" the US EPA acknowledges that it accepts data from the widely use Equilibrium Criterion Model (EQC) (Mackay, 1996). Fugacity modeling will be performed using the EQC model Level III for several representative chemical components of each subcategory in this test plan. The results will be summarized in a robust summary for this endpoint.

4.4 Biodegradation

The materials of this test plan have not been tested for biodegradation. One member from each subcategory will be tested using OECD guideline 301F. The oxidized light distillate, 64742-98-9, will be tested for subcategory 1 and the oxidized petroleum, 64743-00-6, will be tested for subcategory 2. This member of subcategory 2 has been chosen for testing because it has a higher biodegradation potential due to its higher water solubility. The other members of the subcategory are expected to have lower biodegradation potential than this material. Therefore, the results from this test will be extrapolated to the other member of the subcategory. Due to the similarities between the members of this subcategory, extrapolation to the untested members is appropriate.

Table 2 Environmental Fate

CAS #	Photodegradation	Hydrolysis	Fugacity	Biodegradation
Subcategory 1				
64742-98-9	ND	Slow	ND	ND
Subcategory 2				
64743-00-6	ND	Slow	ND	ND
64743-01-7	ND	Slow	ND	ND
68425-34-3	ND	Slow	ND	ND
68602-85-7	ND	Slow	ND	ND
68603-10-1	ND	Slow	ND	ND
68603-11-2	ND	Slow	ND	ND
68603-12-3	ND	Slow	ND	ND

ND – Not determined

5.0 Ecotoxicology Data

5.1 Acute Fish

Acute fish toxicity data is available for one member of subcategory 2 (Table 3). The member tested, 68603-11-2 oxidized methyl ester Ca salt, has a low acute fish toxicity. The test was conducted using rainbow trout following OECD guideline 203. This material has a 96 hr LL50 of 3540 mg/L. Due to the similarities between the members of this subcategory, read across to the untested members is appropriate. Acute fish toxicity data is not available for the member of subcategory 1. The oxidized light distillate, 64742-98-9, will be tested for acute fish toxicity using OECD guideline 203.

5.2 Acute Algae

Acute algae toxicity data is available for one member of subcategory 2 (Table 3). The member tested, 68603-11-2 oxidized methyl ester Ca salt, has a low acute algae toxicity. The acute algae toxicity test was conducted using *Selenastrum capricornutum* following OECD guideline 201. This material has a 72hr EL50 of 3860mg/L. Due to the similarities between the members of the subcategory, read across to the untested members is appropriate. Acute algae toxicity data is not available for the member of subcategory 1. The oxidized light distillate, 64742-98-9, will be tested for fish toxicity using OECD guideline 201.

5.3 Acute Invertebrate

Acute Daphnia toxicity data is available for one member of subcategory 2 (Table 3). The member tested, 68603-11-2 oxidized methyl ester Ca salt, has a low acute invertebrate toxicity. The acute invertebrate toxicity test was conducted using *Daphnia magna* following OECD guideline 202. This material has a 48hr LL50 of 7070mg/L. Due to the similarities between the members of this subcategory, read across to the untested members is appropriate. Acute invertebrate toxicity

data is not available for the member of subcategory 1. The oxidized light distillate, 64742-98-9, will be tested for fish toxicity using OECD guideline 202.

Table 3 Ecotoxicology

CAS #	Acute Fish	Acute Algae	Acute Daphnia
Subcategory 1			
64742-98-9	ND	ND	ND
Subcategory 2			
64743-00-6	ND	ND	ND
64743-01-7	ND	ND	ND
68425-34-3	ND	ND	ND
68602-85-7	ND	ND	ND
68603-10-1	ND	ND	ND
68603-11-2	96hr LL50= 3540mg/L	72hr EL50 =3860 mg/L	48hr LL50= 7070mg/L
68603-12-3	ND	ND	ND

ND- Not determined

6.0 Mammalian Toxicology Data

6.1 Acute Mammalian Toxicity

Acute oral toxicity data is available for four members of subcategory 2 (Table 4). The members tested show a low acute oral toxicity with a LD_{50} greater than 2000 mg/kg. Due to the similarities between the members of this subcategory, read across to the untested members is appropriate. Acute oral toxicity data is not available for the member of subcategory 1. The oxidized light distillate, 64742-98-9, will be tested for acute toxicity using OECD guideline 423.

6.2 Genetic Toxicity

6.2.1 Bacterial Mutagenicity

There is mutagenicity data available for three members of this test plan (Table 4). One member of subcategory 1 and two members of subcategory 2 were tested using the ASTM E1687-98 test method. This method is the preferred method when testing the mutagenicity potential of insoluble oils. All three materials tested were non-mutagenic. The data for the two petroleum oxidates in subcategory 2 will be bridged to the methyl ester and the oxidized salt derivatives. Due to the similarities between the members of this subcategory, read across to the untested members is appropriate. There is adequate bacterial mutagenicity data and no additional testing is required.

6.2.2 Chromosomal Aberration

The materials of this test plan have not been tested for clastogenic activity. One member from each subcategory will be tested using OECD guideline

473. The oxidized light distillate, 64742-98-9, will be tested for subcategory 1 and the oxidized petroleum, 64743-00-6, will be tested for subcategory 2. This member of subcategory 2 has been chosen for testing due to its increased potential for toxicity based upon its physicochemical properties. This material has the lowest molecular weight indicating it will be more bioavailable than the other members of subcategory 2. This material also has a high water solubility indicating that the material will be more lipophilic, which will increase its absorption. The results from the chromosomal aberration test will be bridged to the other members of the subcategory 2. Due to the similarities between the members of this subcategory, read across to the untested members is appropriate.

6.3 Repeated Dose Toxicity

The materials of this test plan have not been tested for chronic toxicity. The member of subcategory 1, 64742-98-9 will be tested using OECD guideline 422. This member has been chosen for testing because it is projected to be the upper boundary of toxicity based upon its physicochemical properties. This material has the lowest molecular weight, which indicates it will be more bioavailable than the other members of the category. This material also has a higher degree of water solubility relative to the other members of the category, which indicates that the material will be more readily bioavailable. The results from this repeated dose toxicity test will be bridged to the other members of the category. Due to the similarities between the members of this category, read across to the untested members is appropriate.

6.4 Reproductive and Developmental Toxicity

The materials of this test plan have not been tested for reproductive or developmental toxicity. The member of subcategory 1, 64742-98-9 will be tested using OECD guideline 422. This member has been chosen for testing because it is projected to be the upper bound of toxicity based upon its physicochemical properties. This material has the lowest molecular weight, which indicates it will be more bioavailable than the other members of category. This material also has a higher degree of water solubility relative to the other members of the category, which indicates that the material will be more readily bioavailable. The results from this reproductive/developmental toxicity test will be bridged to the other members of category. Due to the similarities between the members of this category, read across to the untested members is appropriate.

Table 4 Mammalian Toxicology

CAS #	Acute Health	Bacterial Mutagenicity	Chromosomal Aberration	Repeated dose	Reproductive/ Developmental
Subcategory 1					
64742-98-9	ND	Non-mutagenic	ND	ND	ND
Subcategory 2					
64743-00-6	LD50 >5000mg/kg	Non-mutagenic	ND	ND	ND
64743-01-7	LD50 5000mg/kg	Non-mutagenic	ND	ND	ND
68425-34-3	ND	ND	ND	ND	ND
68602-85-7	ND	ND	ND	ND	ND
68603-10-1	LD50 >2000mg/kg	ND	ND	ND	ND
68603-11-2	LD50 >15mL/kg	ND	ND	ND	ND
68603-12-3	ND	ND	ND	ND	ND

ND – Not Determined

7.0 Test Plan Summary (Table 5)

7.1 Physical and Chemical Properties

- Adequate data is available for all physical and chemical parameters. No additional testing is required.

7.2 Environmental Fate

- Photodegradation data will be calculated for representative chemical components for the materials in subcategory 1 and 2.
- Hydrolysis is expected to be slow for the materials in this test plan and no additional testing is required
- Fugacity data will be calculated for representative chemical components for the materials in subcategory 1 and 2.
- Biodegradation data will be measured using OECD guideline 301F for the member of subcategory 1 (64742-98-9) and for one member of subcategory 2 (64743-00-6) and the latter data bridged to the other members of subcategory 2.

7.3 Ecotoxicology Data

- Acute fish toxicity data is not available for the member of subcategory 1. The member of subcategory 1 (64742-98-9) will be tested using OECD guideline 203.
- Acute algae toxicity data is not available for the member of subcategory 1. The member of subcategory 1 (64742-98-9) will be tested using OECD guideline 201.
- Acute invertebrate toxicity data is not available for the member of subcategory 1. The member of subcategory 1 (64742-98-9) will be tested using OECD guideline 202.

7.4 Mammalian Toxicity Data

- Acute mammalian toxicity data is not available for the member of subcategory 1. The member of subcategory 1 (64742-98-9) will be tested using OECD guideline 423.
- There is adequate bacterial mutagenicity. No additional testing is required.
- Chromosomal aberration data is not available for the members of this test plan. The member of subcategory 1 (64742-98-9) and one member of subcategory 2 (64743-00-6) will be tested using OECD guideline 473. Data generated for the member of subcategory 2 will be bridged to the other members of subcategory 2.
- Repeated dose toxicity data is not available for the members of this test plan. The member of subcategory 1 (64742-98-9) will be tested using OECD guideline 422. Data generated for this member will be bridged to the other members of the category.
- Reproductive and developmental toxicity data is not available for the members of this test plan. The member of subcategory 1 (64742-98-9) will be tested using OECD guideline 422. Data generated for this member will be bridged to the other members of the category.

Table 5 Test Plan Summary

		64742-98-9		64743-00-6	64743-01-7	68425-34-3	68602-85-7	68603-10-1	68603-11-2	68603-12-3
Melting Point	Subcategory 1	v	Subcategory 2	v	v	v	v	v	v	RA
Boiling Point Range		v		v	v	v	v	v	v	RA
Vapor Pressure		v		v	v	v	v	v	v	RA
Partition Coefficient		v		v	v	v	v	v	v	v
Water Solubility		v		v	v	v	v	v	v	RA
Photodegradation		M		M	RA	RA	M	RA	RA	RA
Hydrolysis		v		v	v	v	v	v	v	v
Fugacity		M		M	RA	RA	M	RA	RA	RA
Biodegradation		T		T	RA	RA	RA	RA	RA	RA
Acute Fish		T		RA	RA	RA	RA	RA	v	RA
Acute Algae		T		RA	RA	RA	RA	RA	v	RA
Acute Daphnia		T		RA	RA	RA	RA	RA	v	RA
Acute Health		T		v	v	RA	RA	RA	v	RA
Bacterial Mutagenicity		v		v	v	RA	RA?	RA	RA	RA
Chromosomal Aberration		T		T	RA	RA	RA	RA	RA	RA
Repeated dose		T		RA	RA	RA	RA	RA	RA	RA
Reproductive/ Developmental		T		RA	RA	RA	RA	RA	RA	RA

T= Test; RA= Readacross; M= Computer modeling proposed; v = adequate data exists

8.0 References

ASTDR. (1995). Toxicological Profile for Fuel Oils. Atlanta, GA; US Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry.

Mackay, D., A. Di Guardo, S. Paterson, and C.E. Cowan, (1996). Evaluating the Environmental Fate of a Variety of Types of Chemicals Using the EQC Model. Environ. Toxicol. Chem. 15: 1627-1637.

Neely, W.B. (1985). Hydrolysis. In: W,B. Neely and G.E. Blau, eds. Environmental Exposure from Chemicals. Vol 1., pp. 157-173. CRC Press, Boca Raton, FL, USA.

The Petroleum HPV Testing Group. (2002). High Production Volume (HPV) Chemical Challenge Program. Test Plan- Waxes and Related Materials Category.

Zepp, R.G, and D.M. Cline, (1977). Rates of Direct Photlysis in the Aqueous Environment. Environ. Sci. Technol. 11: 35-366.

ROBUST SUMMARIES FOR TOXICITY TESTING ON PETROLEUM OXIDATES AND DERIVATIVES THEREOF

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Distillates, (petroleum), oxidized light
CAS#	64742-98-9
Remarks	
Method:	
Method/Guideline followed	OECD 102
Test Type	Melting Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.
Results:	-31.0 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS164316A: Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6
Remarks	
Method:	
Method/Guideline followed	OECD 102
Test Type	Melting point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.
Results:	33.6 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS160758A; Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Remarks	
Method:	
Method/Guideline followed	OECD 102
Test Type	Melting point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.

Results:	38.9 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS157210; Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized, calcium salt
CAS#	68425-34-3
Remarks	
Method:	
Method/Guideline followed	OECD 102
Test Type	Melting point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.
Results:	49.9 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166885: Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters
CAS#	68602-85-7
Remarks	
Method:	
Method/Guideline followed	OECD 102
Test Type	Melting point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.
Results:	38.0 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166886: Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Remarks	
Method:	

Method/Guideline followed	OECD 102
Test Type	Melting point
GLP (Y/N)	
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.
Results:	41.8 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166882: Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Melting Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, barium salts
CAS#	68603-10-1
Remarks	
Method:	
Method/Guideline followed	OECD 102
Test Type	Melting point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Differential Scanning Calorimetry (DSC) as described in ASTM E 794-98 was used to determine Melting point.
Results:	42.9 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166881: Determination of Melting Point/Melting Range Following OECD Guideline 102; Envantage Inc., 4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Distillates, (petroleum), oxidized light
CAS#	64742-98-9
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	91 to 450 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS164316A: Determination of the Boiling Point/Boiling Ranges Following OECD Guideline 103; Envantage Inc.,

	4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	201 to >700 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS160758A: Determination of the Boiling Point/Boiling Ranges Following OECD Guideline 103; Envantage Inc., 4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	214 to >700 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS157210: Determination of the Boiling Point/Boiling Ranges Following OECD Guideline 103; Envantage Inc., 4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized, calcium salt

CAS#	68425-34-3
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	352 to >700 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166885: Determination of the Boiling Point/Boiling Ranges Following OECD Guideline 103; Envantage Inc., 4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters
CAS#	68602-85-7
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	204 to >700 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166886: Determination of the Boiling Point/Boiling Ranges Following OECD Guidline 103; Envantage Inc., 4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point

GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	193 to >700 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166882: Determination of the Boiling Point/Boiling Ranges Following OECD Guideline 103; Envantage Inc., 4/19/02

Physical/Chemical Property - Boiling Point	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, barium salts
CAS#	68603-10-1
Remarks	
Method:	
Method/Guideline followed	ASTM D6352-98
Test Type	Boiling Point
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	ASTM D6352-98 Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 deg C by GC was used in place of the atmospheric distillation method outlined in OECD 103 due to wide boiling range of test material.
Results:	193 to >700 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166881: Determination of the Boiling Point/Boiling Ranges Following OECD Guideline 103; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Distillates, (petroleum), oxidized light
CAS#	64742-98-9
Remarks	
Method:	
Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.

Results:	69 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS164316A: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6
Remarks	
Method:	
Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.
Results:	<1 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS160758A: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Remarks	
Method:	
Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.
Results:	<1 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS157210: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized, calcium salt
CAS#	68425-34-3
Remarks	
Method:	

Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.
Results:	< 1 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166885: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters
CAS#	68602-85-7
Remarks	
Method:	
Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.
Results:	<1 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166886: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Remarks	
Method:	
Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.
Results:	<1 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166882: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Vapor Pressure	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, barium salts
CAS#	68603-10-1
Remarks	
Method:	
Method/Guideline followed	OECD 104
Test Type	Vapor Pressure
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Vapor pressure was calculated using partial pressure summation adaptation based on the boiling point range determined by the method ASTM D6352-98.
Results:	<1 Pa at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166881: Determination of the Vapor Pressure Following OECD Guideline 104; Envantage Inc., 4/19/02

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Distillates, (petroleum), oxidized light
CAS#	64742-98-9
Remarks	
Method:	
Remarks	Octanol water partition coefficient could not be measured for this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the raw material, light petroleum distillate is 3.3 to 7.06. The petroleum oxidate in subcategory 1 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be 3.3 to 7.06.
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	ASTDR. 1995. Toxicological Profile for Fuel Oils. Atlanta, GA; US Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry.

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6

Remarks	
Method:	
Remarks	Octanol water partition coefficient could not be measured for this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the starting raw materials petrolatum and slack wax have a calculated partition coefficient greater than 4.9 This petroleum oxidate in subcategory 2 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be greater than 4.9
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	The Petroleum HPV Testing Group. 2002. High Production Volume (HPV) Chemical Challenge Program. Test Plan-Waxes and Related Materials Category.

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Remarks	
Method:	
Remarks	Octanol water partition coefficient could not be measured for this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the starting raw materials petrolatum and slack wax have a calculated partition coefficient greater than 4.9 This petroleum oxidate in subcategory 2 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be greater than 4.9
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	The Petroleum HPV Testing Group. 2002. High Production Volume (HPV) Chemical Challenge Program. Test Plan-Waxes and Related Materials Category.

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized, calcium salt
CAS#	68425-34-3
Remarks	
Method:	

Remarks	Octanol water partition coefficient could not be measured for this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the starting raw materials petrolatum and slack wax have a calculated partition coefficient greater than 4.9 This petroleum oxidate in subcategory 2 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be greater than 4.9
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	The Petroleum HPV Testing Group. 2002. High Production Volume (HPV) Chemical Challenge Program. Test Plan-Waxes and Related Materials Category.

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters
CAS#	68602-85-7
Remarks	
Method:	
Remarks	Octanol water partition coefficient could not be measured for this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the starting raw materials petrolatum and slack wax have a calculated partition coefficient greater than 4.9 This petroleum oxidate in subcategory 2 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be greater than 4.9
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	The Petroleum HPV Testing Group. 2002. High Production Volume (HPV) Chemical Challenge Program. Test Plan-Waxes and Related Materials Category.

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Remarks	
Method:	
Remarks	Octanol water partition coefficient could not be measured for

	this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the starting raw materials petrolatum and slack wax have a calculated partition coefficient greater than 4.9 This petroleum oxidate in subcategory 2 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be greater than 4.9
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	The Petroleum HPV Testing Group. 2002. High Production Volume (HPV) Chemical Challenge Program. Test Plan-Waxes and Related Materials Category.

Physical/Chemical Property – Partition Coefficient	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, barium salts
CAS#	68603-10-1
Remarks	
Method:	
Remarks	Octanol water partition coefficient could not be measured for this material because it is a class 2 substance that contains a mixture of hydrophilic and hydrophobic materials. The hydrophilic acids partitioned into the water phase while the hydrophobic, aliphatic hydrocarbons and methyl esters partitioned into the octanol phase giving a distorted value for octanol water partition coefficient. The calculated octanol water coefficient for the starting raw materials petrolatum and slack wax have a calculated partition coefficient greater than 4.9 This petroleum oxidate in subcategory 2 is expected to have a similar octanol partition coefficient to the starting raw material.
Results:	Estimated to be greater than 4.9
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	The Petroleum HPV Testing Group. 2002. High Production Volume (HPV) Chemical Challenge Program. Test Plan-Waxes and Related Materials Category.

Physical/Chemical Property - Water Solubility	
Test Substance:	
Chemical Name	Distillates, (petroleum), oxidized light
CAS#	64742-98-9
Remarks	
Method:	
Method/Guideline followed	OECD 105
Test Type	Water Solubility

GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	59336 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS164316A: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Physical/Chemical Property - Water Solubility	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6
Remarks	
Method:	
Method/Guideline followed	OECD 105
Test Type	Water Solubility
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	1248 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS160758A: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Physical/Chemical Property - Water Solubility	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Remarks	
Method:	
Method/Guideline followed	OECD 105
Test Type	Water solubility
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	347 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS157210: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Physical/Chemical Property - Water Solubility	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized, calcium salt
CAS#	68425-34-3
Remarks	
Method:	

Method/Guideline followed	OECD 105
Test Type	Water Solubility
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	346 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166885: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Physical/Chemical Property - Water Solubility	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters
CAS#	68602-85-7
Remarks	
Method:	
Method/Guideline followed	OECD 105
Test Type	Water Solubility
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	537 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166886: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Physical/Chemical Property - Water Solubility	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Remarks	
Method:	
Method/Guideline followed	OECD 105
Test Type	Water Solubility
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	1287 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166882: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Physical/Chemical Property – Water Solubility	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters,

	barium salts
CAS#	68603-10-1
Remarks	
Method:	
Method/Guideline followed	OECD 105
Test Type	Water Solubility
GLP (Y/N)	N
Year (Study Performed)	2001 - 2002
Remarks	Shake flask method
Results:	550 ppb at 25 C
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS166881: Determination of the Water Solubility Following OECD Guideline 105; Envantage Inc., 4/19/02

Environmental Fate - Hydrolysis	
Test Substance:	
Remarks	Materials in the Petroleum oxidates and derivatives thereof category.
Method:	
Remarks	Hydrolysis of a chemical is a transformation process in which an organic chemical reacts with water, forms a new carbon oxygen bond, and cleaves a carbon - X bond in the original molecule, where X is the leaving group. Chemicals that have the potential to hydrolyze include alkyl halides, amides, carbamates, carboxylic acid esters and lactones, epoxides, phosphate esters, and sulfonic acid esters. Materials in the "Petroleum Oxidate and Derivatives Thereof" category do not contain hydrolyzable functional groups therefore hydrolysis if any is expected to be slow.
Results:	Hydrolysis is expected to be slow.
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	Neely, W.B. 1985. Hydrolysis. In: W,B. Neely and G.E. Blau, eds. Environmental Exposure from Chemicals. Vol 1., pp. 157-173. CRC Press, Boca Raton, FL, USA.

Acute Toxicity - Fish	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	OECD 203
Test Type	Water accommodated fraction
GLP (Y/N)	N
Year (Study Performed)	1999
Species/Strain/Supplier	Rainbow trout (*Oncorhynchus mykiss*)

Analytical Monitoring	None
Exposure Period (unit)	96 hours
Statistical Methods	Binomial
Remarks field for test conditions	Test Organisms: Source – unknown; Age – unknown; Length – 5.0 cm +/- 1cm; Wet weight – unknown; Loading density – 0.95g/L; Pretreatment – none, fish were acclimated for 12 days in lab culture water. Test System: A water accommodated fraction test was conducted at concentrations of 625, 1250, 2500, 5000, and 10,000 mg/L.. The fish were not fed for 24 hours before nor during the test. The test was conducted in plastic-lined containers that contained 4 L of test solution. 7 fish were used for each test concentration (no replicates were used). The test solution was aerated at 6.5 ml/min/L or 26ml/min/test volume. The test solution was maintained on a photoperiod of 16 hours light and 8 hours darkness. Preparation of test material: ASTM D6081-97 (modified) The test material was weighed and topped off with one liter of dechlorinated laboratory water, to achieve the desired highest test exposure load. The container holding the test item solution was mounted on an orbital shaker and covered with parafilm and shaken at 110 rpm for 24 hours before settling. After settling for 4 hours the WAF was dispensed from the top of the container. The WAF was then diluted with dechlorinated laboratory water to achieve the appropriate exposure load. The control of 100% laboratory water was prepared in a similar manner. Dilution water: Source – dechlorinated laboratory water; Hardness – Unknown; Analysis - unkown; Water chemistry in test: DO (mg/L) – 7-10; pH – 7.33 -8.23; specific conductance – 294-480umhos/cm. Test Temperature (C) - 15 +/- 2 Test Levels: Control shaken and unshaken, 625, 1250, 2500, 5000 ,10,000 mg/L.
Results:	96 hour LL50 = 3540 mg/L; 95% confidence interval = 2500-5000mg/L
Remarks:	Reference Substance: Potassium chloride Reference substance toxicity – LC50 = 4070mg/L with 95% confidence interval of 3590-4620 probit.
Conclusions:	96 hour LL = 3540 mg/L.
Data Quality:	Reliable with restrictions – Klimisch code 2
Data Quality Remarks:	Study is valid but is reliable with restrictions because it was not performed under GLP.
References:	96 hour Acute Lethality Test to Rainbow Trout (*Oncorhynchus mykiss*) on Alox 165 Batch 99491. Beak International test # 9900484-1; Beak International Incorporated, June 16, 1999.

Acute Toxicity - Algae	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	OECD 201
Test Type	Static
GLP (Y/N)	N
Year (Study Performed)	1999
Species/Strain/Supplier	Algae (*Selenastrum capricornutum)*/ UTCC 37 / In-house culture
Element basis	10,000 cells/mL
Analytical Monitoring	None
Exposure Period (unit)	72 hours
Statistical Methods	Moving average and Dunnett's test.
Remarks field for test conditions	Test Organisms: Cells were taken from an in-house culture of *Selenastrum capricornutum* which originated from University of Toronto Culture Collection (UTCC). The organisms' age was 4-7 days (in exponential growth). Preparation of test material: ASTM D6081-97 (modified) The test material was weighed and topped off with one liter of growth medium, to achieve the desired highest test exposure load. The container holding the test item solution was mounted on an orbital shaker and covered with parafilm and shaken at 110 rpm for 24 hours before settling. After settling for 4 hours the WAF was dispensed from the top of the container. The WAF was then diluted with growth medium to achieve the appropriate exposure load. The control of 100% growth medium was prepared in a similar manner. Test Conditions: A water accommodated fraction test was conducted at concentrations of 156, 313, 625, 1250, 2500, 5000, and 10,000 mg/L.. The test was conducted in 125mL Erlenmeyer flasks that contained 50mL of test solution. The cell density was 10,000 cells/mL (after dilution from 1 x 10^6 inoculum). There were 3 replicates per concentration. The test solution was maintained on a continuous photoperiod with "cool white" fluorescent lighting at approximately 8,000 lux. Shaken and unshaken growth medium were included as controls in the test to account for any effects of the shaking procedure on algae growth. Algae cells were introduced into 50mL test solution to obtain a final cell density of 10,000 cells/mL. Every 24 hrs, a 1-mL sample was removed from each of the test replicates and cells were counted using a microscope and hemacytometer. Dilution water: Source – Filtered culture medium; Hardness –

	Unknown; Analysis - unknown; Water chemistry in test: DO (mg/L) –unknown ; pH – 6.40-10.09 Test Temperature (C) – 23 +/- 2 Test Levels: Control shaken and unshaken, 156, 313, 625, 1250, 2500, 5000 ,10,000 mg/L.
Results:	EL50 = 3860 mg/L with 95% confidence interval of 3600 – 4110 determined by moving average based data from 24, 48, and 72 hour. NOEL = 1250 mg/L calculated from 72 hour data using the Dunnett's test .
Remarks:	Reference Substance: Zinc Sulfate Reference substance toxicity – IC50 = 32ug/L
Conclusions:	
Data Quality:	Reliable with restrictions – Klimisch code 2
Data Quality Remarks:	Study is valid but is reliable with restrictions because it was not performed under GLP.
References:	72 hour Acute Algae growth Inhibition test on Alox 165 Batch 99491. Beak International test # 9900484-2; Beak International Incorporated, June 11, 1999.

Acute Toxicity -Invertebrate	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized, Me esters, calcium salts
CAS#	68603-11-2
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	OECD 202
Test Type	Static
GLP (Y/N)	N
Year (Study Performed)	1999
Species/Strain/Supplier	Daphnia magna
Analytical Monitoring	None
Exposure Period (unit)	48 hours
Statistical Methods	Binomial probability
Remarks field for test conditions	Test Species: < 24hr old neonates Preparation of test material: ASTM D6081-97 (modified) The test material was weighed and topped off with one liter of dechlorinated laboratory water, to achieve the desired highest test exposure load. The container holding the test item solution was mounted on an orbital shaker and covered with parafilm and shaken at 110 rpm for 24 hours before settling. After settling for 4 hours the WAF was dispensed from the top of the container. The WAF was then diluted with dechlorinated laboratory water to achieve the appropriate exposure load. The control of 100% laboratory water was prepared in a similar manner.

	Test Conditions: A water accommodated fraction test was conducted at concentrations of 625, 1250, 2500, 5000, and 10,000 mg/L. The daphnia were not fed for during the test. The test was conducted in 120ml glass jars with a test volume of 75ml. 5 daphnia per chamber were used for each test concentration with 4 replicates per concentration. The test solution was not aerated during exposure period. The test solution was maintained on a photoperiod of 16 hours light and 8 hours darkness. Dilution water: Source – Aged reconstituted water (>24hrs), with a dissolved content of 90 to 100% saturation at time of use.; Hardness – 130mg/L at test initiation; Analysis - unknown; Water chemistry in test: DO (mg/L) – >40% <100% ; pH – 7.99-8.19; specific conductance 409-553 umhos/cm Test Temperature (C) – 20 +/- 2 Element: Immobilization/mortality Test Levels: Control shaken and unshaken, 625, 1500, 2500, 5000, 10000 mg/L.
Results:	48hr- LL50= 7070mg/L 95% confidence Interval 5000 – 10,000 mg/L
Remarks:	Reference Substance: Sodium Chloride Reference substance toxicity – LC50= 4650mg/L 95% confidence Interval 3600- 6000 mg/L.
Conclusions:	
Data Quality:	Reliable with restrictions – Klimisch code 2
Data Quality Remarks:	Study is valid but is reliable with restrictions because it was not performed under GLP.
References:	48-hour Acute Lethality Test for *Daphnia magna* on Alox 165 Batch 99491. Beak International test # 9900484-0; Beak International Incorporated, June 2, 1999.

Acute Toxicity - Oral	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	OECD 401
Test Type	Acute Oral Toxicity, Single Level
GLP (Y/N)	Y
Year (Study Performed)	1993
Species	Rat
Strain	Sprague-Dawley
Route of Administration	Oral
Dose Levels	5.0 g/kg

Sex and Number/Group	5 male and 5 female
Frequency of Treatment	Animals were given 24hrs to consume test material.
Duration of Test	14 day observation post-treatment
Control Group	No negative control group
Results:	LD50 > 5.0 g/kg
Remarks:	Five male and five female Sprague-Dawley rats weighing 200 to 240 grams were used for this study. The animals were deprived of food but not water overnight prior to dosing. The test article was ground into small pieces and mixed with 4mL of peanut butter and 2 mL of honey. All 10 of the animals consumed the test article within 24hrs. The animals were allowed water and food ad libitum for the 14-day observation period. The rats were observed for any signs of toxicity and mortality throughout the 14-day observation period. Animals were observed frequently on the day of dosing and a careful clinical examination was performed at least once a day. Individual body weights were recorded on the day of dosing, Day 9, and prior to sacrifice. There were no abnormal observations noted throughout the 14-day observation period. No gross abnormalities were observed in the five males or five females at necropsy.
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	Summary of Results of acute toxicology study: Batch 57725, Bioresearch Inc., 3/17/93.

Acute Toxicity - Oral	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	Consistent with OECD 401/ Limit test
Test Type	Acute Oral Toxicity
GLP (Y/N)	No
Year (Study Performed)	1969
Species	Unknown
Strain	Rats
Route of Administration	Oral
Dose Levels	5.0 g/kg
Sex and Number/Group	10 males
Frequency of Treatment	Single oral dose
Duration of Test	14-day observation post-treatment
Control Group	No negative control group
Results:	LD50 > 5.0 g/kg
Remarks:	5 g/Kg of test material was administered in warm corn oil via feeding needle. All animals exhibited varying degrees of diarrhea. 0/10 deaths were observed after 14 days.
Data Quality:	Reliable with restrictions – Klimisch code 2

References:	Lawall & Harrisson Research Laboratories Inc.; January 29, 1969.

Acute Toxicity - Oral	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	68603-10-1
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	OECD 423
Test Type	Acute Oral Toxicity
GLP (Y/N)	Yes
Year (Study Performed)	2002
Species	Wistar Albino
Strain	Rats
Route of Administration	Oral
Dose Levels	2.0 g/kg
Sex and Number/Group	3 male and 3 females
Frequency of Treatment	Single oral dose
Duration of Test	14-day observation post-treatment
Control Group	No negative control group
Results:	LD50 > 2.0 g/kg
Remarks:	Three healthy male and three healthy female Wistar albino rats were weighing between 200 and 260 grams were dosed orally at 2000mg/kg. Feed was freely available except for 16-20 hours prior to dosing. Water was available at all times. A single dose of the test material was administered orally by syringe and dosing needle. The rats were then observed 1, 2, 3 and 4 hours post dose and once daily for 14 days for mortality, toxicity and pharmacological effects. All body weight changes were normal in 3/3 males and 1/3 females. Two females lost weight during the second week of the observation period. Instances of dyspnea were noted in the females on the day of dosing only. The necropsy results were normal.
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	MB Research Laboratories; Acute Toxic Class Determination (Oral) for 125U-56; September 24, 2002.

Acute Toxicity - Oral	
Test Substance:	
Chemical Name	Hydrocarbon waxes (petroleum) Oxidized Me ester, Ca salts
CAS#	68603-11-2
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	OECD 401

Test Type	Acute Oral Toxicity
GLP (Y/N)	N
Year (Study Performed)	1980
Species	Sprague Dawley
Strain	Rats
Route of Administration	Oral
Dose Levels	5, 10, and 15 ml/kg
Sex and Number/Group	5 male and 5 female for each dosage
Frequency of Treatment	Single intubation
Duration of Test	14-day observation post-treatment
Control Group	No negative control group
Results:	LD50 > 15 ml/kg
Remarks:	Ten Sprague Dawley rats (5 male and 5 female) each weighing between 200 and 300 grams, were selected for each dose. The animals were fed commercial rat food diet. Water was available ad libitum. Food was removed 12 to 24 hours before dosage. The sample was fed to unanesthetized animals by oral intubation using a 16 gauge “ball point” needle and syringe. The animals were observed for gross toxicological effects immediately after administration of the sample, after 1 hour, after 4 hours, and once daily for 14 days. The LD50 was calculated using the method of J.T. Litchfield and F. Wilcoxon – “A Simplified Method of Evaluating Dose-Effect Experiments”. There were no deaths in any animals at any dose level. The LD50 is greater than 15ml/kg.
Data Quality:	Reliable with restrictions – Klimisch code 2
References:	Alox 165; Acute Oral Toxicity; United States Testing Company, Inc.; 5/2/80.

Invitro Genetic Toxicity	
Test Substance:	
Chemical Name	Distillates, (petroleum), oxidized light
CAS#	64742-98-9
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	ASTM E1687-98
Test Type	Modified Ames Test
GLP (Y/N)	N
Year (Study Performed)	2000
System of Testing	*Salmonella typhimurium* TA98
Concentration	0, 6, 12, 18, 24, 30 µL per plate
Metabolic Activation	With metabolic activation
Results:	MI= 0.23
Remarks:	The tester strain S. typhimurium TA 98 was used in this study. Three dimethyl sulfoxide (DMSO) extracts of the test article and one reference oil were tested. The test material was extracted by adding 5 volumes of DMSO to one volume

	of sample, which was vortexed for 30 seconds every five minutes for 30 minutes at room temperature. The material was centrifuged and the extract was removed. The sample extracts were diluted in DMSO to the appropriate concentration in 60uL dosing aliquots. The sample extracts were tested at 0, 6, 12, 18, 24, and 30, uL per plate. The reference oil was tested at 0, 3, 6, 9, 12, and 15uL per plate. The S-9 was derived from Syrian Golden Hamster liver, prepared by and purchased from Molecular Toxicology Inc. The mean reverents per plate were plotted against volume of DMSO extract for the test articles and reference oil. The data was analyzed using a suitable graphics-statistics program to determine the slope of the dose-response curve which gives the Mutagenicity Index (MI) of the material. Modified Ames Testing of petroleum streams has shown that oils with MI's greater than 1 are likely to be carcinogenic in the mouse skin-painting bioassay, while oils with MI under 1 are not. This material with a MI of 0.23, is not likely to be mutagenic.
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS158944: Modified Ames Testing of Fifteen Wax Samples from Lubrizol Corp.; Petro Labs Inc. October 26, 2000.

Invitro Genetic Toxicity	
Test Substance:	
Chemical Name	Hydrocarbon waxes, (petroleum), oxidized
CAS#	64743-00-6
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	ASTM E1687-98
Test Type	Modified Ames Test
GLP (Y/N)	N
Year (Study Performed)	2000
System of Testing	*Salmonella typhimurium* TA98
Concentration	0, 6, 12, 18, 24, 30 µL per plate
Metabolic Activation	With metabolic activation
Results:	MI= 0.16
Remarks:	The tester strain S. typhimurium, TA 98 was used in this study. Three dimethyl sulfoxide (DMSO) extracts of the test article and one reference oil were tested. The test material was extracted by adding 5 volumes of DMSO to one volume of sample, which was vortexed for 30 seconds every five minutes for 30 minutes at room temperature. The material was centrifuged and the extract was removed. The sample extracts were diluted in DMSO to the appropriate concentration in 60uL dosing aliquots. The sample extracts were tested at 0, 6, 12, 18, 24, and 30, uL per plate. The reference oil was tested at 0, 3, 6, 9, 12, and 15uL per plate. The S-9 was derived from Syrian Golden Hamster liver, prepared by and purchased from Molecular Toxicology Inc. The mean reverents per plate were plotted against volume

	of DMSO extract for the test articles and reference oil. The data was analyzed using a suitable graphics-statistics program to determine the slope of the dose-response curve, which gives the Mutagenicity Index (MI) for that material. Modified Ames Testing of petroleum streams has shown that oils with MI's greater than 1 are likely to be carcinogenic in the mouse skin-painting bioassay, while oils with MI under 1 are not. This material with a MI of 0.16 is not likely to be mutagenic.
Data Quality:	Reliable without restrictions – Klimisch code 1
References:	OS158948: Modified Ames Testing of Fifteen Wax Samples from Lubrizol Corp.; Petro Labs Inc. October 26, 2000.

Invitro Genetic Toxicity	
Test Substance:	
Chemical Name	Petrolatum, (petroleum), oxidized
CAS#	64743-01-7
Purity	100% commercial product.
Remarks	
Method:	
Method/Guideline followed	ASTM E1687-98
Test Type	Modified Ames Test
GLP (Y/N)	N
Year (Study Performed)	2000
System of Testing	*Salmonella typhimurium* TA98
Concentration	0, 12, 24, 36, 48, 60 µL per plate
Metabolic Activation	With metabolic activation
Results:	MI=0
Remarks:	The tester strain S. typhimurium, TA 98 was used in this study. Three dimethyl sulfoxide (DMSO) extracts of the test article and one reference oil were tested. The test material was extracted by adding 5 volumes of DMSO to one volume of sample, which was vortexed for 30 seconds every five minutes for 30 minutes at 70C. The material was centrifuged and the extract was removed. The sample extracts were diluted in DMSO to the appropriate concentration in 60uL dosing aliquots. The sample extracts were tested at 0, 12, 24, 36, 48, and 60, uL per plate. The reference oil was tested at 0, 3, 6, 9, 12, and 15uL per plate. The S-9 was derived from Syrian Golden Hamster liver, prepared by and purchased from Molecular Toxicology Inc. The mean reverents per plate were plotted against volume of DMSO extract for the test articles and the reference oil. The data was analyzed using a suitable graphics-statistics program to determine the slope of the dose-response curve, which gives the Mutagenicity Index (MI) for the material. Modified Ames Testing of petroleum streams has shown that oils with MI's greater than 1 are likely to be carcinogenic in the mouse skin-painting bioassay, while oils with MI under 1 are not. This material with a MI of 0 is not likely to be mutagenic.
Data Quality:	Reliable without restrictions – Klimisch code 1

References:	OS158941: Modified Ames Testing of Fifteen Wax Samples from Lubrizol Corp.; Petro Labs Inc. October 26, 2000.